

December 8, 2005
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Mr. Jerry Wickham, Hazardous Materials Specialist
Alameda County Health Care Services Agency
Environmental Health Services – Environmental Protection (ACEH)
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: Response to August 16, 2005 ACEH Letter
Work Plan for Additional Soil and Groundwater Investigation and Other Items
Arrow Rentals Site, 187 North L Street, Livermore, California
Fuel Leak Case No. RO0000394

Dear Mr. Wickham:

INTRODUCTION

In response to the ACEH letter dated August 16, 2005, Aquifer Sciences, Inc. (ASI) has prepared this *Work Plan for Additional Soil and Groundwater Investigation and Other Items* for the subject site.

Between 1988 and 1996, Woodward-Clyde Consultants (WCC) conducted several soil and groundwater investigations at the site. From 1989 to 2004, groundwater monitoring has been performed at the site. On August 8, 2005, ASI submitted a *Request for Case Closure* report. Due to petroleum hydrocarbons remaining in groundwater, inadequate characterization of the vertical extent of contamination in soil, no reporting of lead scavenger analysis for past groundwater samples, and other issues ACEH has recommended that additional work be completed before case closure can be granted. Information about the site and our proposed scope of work are presented below.

DESCRIPTION OF SITE AND VICINITY

The site encompasses approximately 18,000 square feet of relatively flat land, and is located on the western side of North L Street in northern Livermore, California (Figure 1). Arrow Rentals, an equipment rental company, occupies the site. A building covers approximately 850 square feet, and is located in the northern portion of the site (Figure 2). The remainder of the site is paved with asphalt or concrete. The site is bounded on the north by railroad tracks, on the east by North

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L Street, and on the south and west by a residential development. Residential housing, commercial businesses, and light industry are present in the vicinity.

The site is located in an east-west trending valley known as the Livermore Valley. The valley is bounded by hills on the north reaching elevations of more than 1,200 feet above mean sea level (MSL), and by hills on the south reaching elevations of more than 900 feet above MSL. The elevation of the valley floor ranges from more than 500 feet in the east to approximately 350 feet in the west. The site is approximately 480 feet above MSL. The land surface in the vicinity of the site slopes to the northwest at approximately 0.9 foot per 100 feet.

The channels of two streams, Arroyo Mocho and Arroyo Las Positas, are present in the site vicinity. Arroyo Mocho is located approximately 3,800 feet southwest of the site, while Arroyo Las Positas is located approximately 1.1 miles north of the site. Both streams flow to the west toward the City of Pleasanton. Due to distance, contamination at the site likely does not impact either stream.

REGIONAL HYDROGEOLOGY

The site is underlain by approximately 750 feet of valley-fill deposits, consisting of Quaternary alluvium and the Livermore Formation. The valley-fill deposits are underlain by the Pliocene-age Tassajara Formation (DWR, 1966).

The oldest relevant geologic unit is the Tassajara Formation, which consists of freshwater deposits of moderately indurated sandstone, siltstone, shale, conglomerate, and limestone (DWR, 1974). The Tassajara Formation probably underlies the valley-fill deposits near the site at a depth of approximately 750 feet.

The Livermore Formation has been divided into two facies: one clay and one gravel (DWR, 1974). The clay facies is believed to underlie the gravel facies and represents a lacustrine phase of deposition. The gravel facies consists of unconsolidated beds of gravel, sand, silt, and clay (DWR, 1966). The Livermore Formation occurs at a shallow depth in some areas and is difficult to distinguish from the valley-fill deposits.

Quaternary valley-fill alluvium forms the valley floor beneath the site, thickening to the east. The alluvium consists of lenticular beds of gravel, sand, silt, and clay, representing reworked sediments of the Livermore Formation. The thickness of the alluvium ranges from approximately 20 to 350 feet and locally deeper.

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LOCAL HYDROGEOLOGY

At the site, alluvial deposits of silty and clayey gravel and sand extend between the ground surface to depths of approximately 35 to 40 feet below grade (fbg), underlain by layers of silt and clay (WCC, 1991). In April 2004, the depth to groundwater in monitoring wells at the site was approximately 30 fbg (Aquifer Sciences, 2004). In the early 1990s, due to an extended drought the depth to groundwater was greater, approximately 40 fbg. Groundwater generally flows to the west, with a hydraulic gradient of approximately 0.019 ft/ft (Aquifer Sciences, 2004).

AQUIFER TESTING

In 1990, slug tests were conducted in groundwater monitoring wells W-A and W-B to evaluate the hydraulic conductivity of the aquifer. The reported hydraulic conductivity from these slug tests was 4×10^{-4} centimeters per second (WCC, 1991).

ENVIRONMENTAL SITE HISTORY

A Mobil service station operated at the site between approximately 1951 and 1968 (WCC, 1991). Arrow Rentals purchased the site in 1972. In 1972, three of five underground fuel storage tanks were removed after failing integrity tests. The two remaining tanks were used until removal in 1986, after the installation of a new 1,000-gallon underground fuel tank and a new vapor monitoring well in 1985.

In approximately 1985, a delivery truck operator from Petcock Petroleum accidentally dispensed approximately 600 gallons of fuel into the vapor well (WCC, 1989). After the fuel release, water was reportedly poured from a garden hose into the vapor well.

Environmental investigations since 1988 have included drilling soil borings; collecting and analyzing soil, soil vapor, and groundwater samples; installing groundwater monitoring wells; performing aquifer tests; and conducting periodic groundwater monitoring. Primarily, the samples were analyzed for total petroleum hydrocarbons quantified as gasoline (TPH-g), diesel (TPH-d), and motor oil (TPH-mo); benzene, toluene, ethylbenzene, and xylenes (BTEX); and methyl tertiary butyl ether (MTBE). The general findings from laboratory analyses conducted on soil and groundwater samples are summarized below.

ANALYTICAL DATA FOR SOIL

Analytical data for 121 soil samples collected from 27 locations indicate the majority of petroleum hydrocarbon contamination in soil is present in the vicinity of borings B-1, B-1A, B-G, B-H, W-A, and W-1 (Figure 2). The soil contamination at borings B-1A, B-H, and W-A appears to be associated with petroleum hydrocarbon contamination in groundwater.

Petroleum hydrocarbons detected in soil include TPH-g (up to 16,000 mg/kg), TPH-d (up to 1,500 mg/kg), benzene (up to 220 mg/kg), toluene (up to 1,100 mg/kg), ethylbenzene (up to 340 mg/kg), xylenes (up to 1,500 mg/kg), naphthalene (up to 3.4 mg/kg), 2-methyl-naphthalene (up to 3.5 mg/kg), and phenol (up to 0.3 mg/kg).

The highest concentrations of petroleum hydrocarbons were detected in soil samples collected approximately 40 fbg. Since the depth to groundwater ranges from approximately 20 to 40 fbg at the site, some or all of the soil samples deeper than 20 feet may have been collected from the saturated zone. The highest concentrations of petroleum hydrocarbons were detected in the vadose zone in borings B-G (6,700 mg/kg) and W-1 (1,200 mg/kg) at depths of approximately 16 fbg and 15 fbg, respectively.

ANALYTICAL DATA FOR GROUNDWATER

In 1988, three groundwater monitoring wells (W-1, W-2, and W-3) were installed at the site. In 1990, five groundwater monitoring wells (W-A, W-B, W-C, W-D, and W-E) were installed at or near the site. In 1996, four additional groundwater monitoring wells (W-1s, W-3s, W-Bs, and W-Es) were installed. The well locations are shown on Figure 2. Petroleum hydrocarbons have been detected in groundwater samples collected from the wells.

No sampling of wells W-1, W-2, W-3, and W-E has been conducted since September 13, 1995. No sampling of wells W-A, W-B, W-C, and W-D has been conducted since July 1990. Since March 1996, groundwater samples have been collected from four monitoring wells (W-1s, W-3s, W-Bs, and W-Es) on a near semiannual basis, with the last samples collected on September 30, 2004. Wells W-1s, W-3s, and W-Bs are located at the site, while well W-Es is located downgradient and off-site (Figure 2).

Elevated concentrations of TPH-g, TPH-d, TPH-mo, BTEX compounds, and MTBE have been detected in samples collected from wells W-1s and W-Bs. Lower concentrations of petroleum hydrocarbons have been detected in samples collected from well W-3s, while samples from well W-Es have occasionally contained low concentrations of petroleum hydrocarbons.

The approximate lateral extent of contamination in groundwater is shown on Figure 2. In July 1990, floating product was detected in well W-1. In November 2001, 0.14 foot of floating product was measured in well W-1s. Floating product has not been measured during any other monitoring event for well W-1s.

ANALYTICAL DATA FOR SOIL VAPOR

Petroleum hydrocarbons detected in soil vapor include TPH-g (up to 2,000 $\mu\text{g}/\text{m}^3$), benzene (up to 16 $\mu\text{g}/\text{m}^3$), toluene (up to 46 $\mu\text{g}/\text{m}^3$), ethylbenzene (up to 11 $\mu\text{g}/\text{m}^3$), and xylenes (up to 66 $\mu\text{g}/\text{m}^3$). All of the petroleum hydrocarbons were detected in soil vapor at concentrations less than residential and commercial/industrial environmental screening levels (ESLs). Fugro West is currently completing an additional soil vapor investigation at the site.

SCOPE OF WORK

The main objective of this Work Plan is to address technical comments presented by ACEH in their August 16, 2005, letter. The comments are listed below, along with a response to each comment.

Technical Comment 1: Table 1 – Analytical Data for Soil

Response - ASI provided this table in the August 8, 2005, *Request for Case Closure* report, and is pleased that the table is useful to ACEH.

Technical Comment 2: Analytical Data for Soil Vapor

Response – As discussed, Fugro West is currently completing an additional, updated soil vapor investigation at the site.

Technical Comment 3: Vertical Extent of Soil and Groundwater Contamination

Response - To further evaluate the vertical extent of soil and groundwater contamination at the site, ASI recommends the drilling and sampling of several exploratory borings utilizing a truck-mounted drill rig. We evaluated whether a direct-push or cone penetration rig could be used at the site. Due to the presence of dense gravels in the subsurface, and the fact exploratory borings would have to be extended to over 50 fbg, we believe conventional drilling and sampling techniques are more appropriate.

Prior to initiating the field exploration program, ASI will prepare a health and safety plan for the proposed drilling and sampling program. Drilling permits will be obtained from ACEH. ASI will mark the proposed drilling locations in the field, notify Underground Service Alert (USA) to check the drilling locations for subsurface utilities, and hire an independent locator service to perform an underground utility check.

Four borings will be drilled at the site at the approximate locations shown on Figure 2. The borings will extend approximately 75 fbg. A State of California C-57-licensed contractor using a

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truck-mounted rig and 6- or 8-inch diameter hollow-stem augers will conduct the drilling operations. All drilling equipment and sampling tools will be steam-cleaned prior to beginning the field program. Reusable sampling equipment will be washed with an Alconox solution, rinsed with tap water, and rinsed with distilled water prior to each use.

An Aquifer Sciences hydrogeologist will supervise the drilling and sampling activities. Soil will be examined and logged in accordance with the Standard Practice for Description of Soils (Visual-Manual Procedure), ASTM Designation D-2488, issued in 2000. A portable organic vapor meter and flame ionization detector (FID) will be used to screen the soil samples. Organic vapor and FID readings will be noted on the drilling logs. Ambient air will also be monitored for organic and FID compounds during drilling. A California Professional Geologist (PG) will provide technical guidance and oversight of the drilling and sampling program.

Soil samples will be collected from each boring at 5-foot intervals from approximately 50 to 75 fbg. The samples will be collected in clean liners, sealed, labeled, stored on ice in a cooler at 4° Celsius, and transported under chain-of-custody protocol within 24 hours of collection to a state-certified analytical laboratory for chemical analysis as discussed below.

Grab groundwater samples will be collected from each boring using 3/4-inch temporary slotted PVC casing and disposable bailers. The samples will be collected in clean bottles, sealed, labeled, stored on ice in a cooler at 4° Celsius, and transported within 24 hours of collection under chain-of-custody protocol to a state-certified analytical laboratory for chemical analysis as discussed below.

When the soil and groundwater sampling is completed, we will instruct the drilling contractor to seal each boring with grout consisting of 95% Portland Type I-II cement and 5% bentonite. Soil cuttings, equipment wash, rinse water, and excess grout will be stored on-site in sealed and labeled DOT-approved 55-gallon drums. The drums will be stored at the site pending the results of the laboratory analysis.

The soil and groundwater samples will be analyzed for TPH-g using EPA Modified Method 8015C; TPH-d by 8015C with silica gel cleanup, and; BTEX, MTBE, ethanol, di-isopropyl ether (DIPE), tertiary butyl alcohol (TBA), tertiary amyl methyl ether (TAME), and ethyl tertiary-butyl ether (ETBE).

Technical Comment 4: Vertical Hydraulic Gradients

Response - Four well pairs exist at the site, W-1/W-1s, W-3/W-3s, W-B/W-Bs, and W-E/W-Es. To assess vertical hydraulic gradient at the site, attempts will be made to locate and identify the well pairs and all other on-site and off-site monitoring wells. Once the wells have been located, the depth to water in each well will be measured using a portable water level meter. The total depth

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of each well will also be measured. We will also research ACEH files for the nearby Valley Gas site for information regarding the vertical hydraulic gradient at that site.

Technical Comment 5: Well Survey Results

Response - Our August 8, 2005, *Request for Case Closure* report, provided Table 4, WELL SURVEY RESULTS. California Well Service Well #8 was not discussed in the closure report, and Well 3S/2E8R15 was discussed in the report text but was not listed in Table 4. A domestic well may be located at 1962 Railroad Avenue, and information about that well is not included in Table 4. ASI proposes to research the status of the domestic well, discuss the potential (if any) for the well to act as a vertical conduit, and provide an updated Table 4.

Technical Comments 6 and 9: Cross Sections and Long-Screen Wells

Response - Updated geologic cross sections will be prepared that depict our interpretation of the subsurface lithology beneath the site and adjacent areas. The cross sections will depict the "as-built" construction of on-site and off-site monitoring wells, including the depths of the well screens and filter packs, as previously reported by WCC.

In 1996, WCC installed monitoring wells W-1s, W-Bs, W-3s, and W-Es, and these wells have screen lengths and filter packs of 25 feet (from 20 to 45 fbg). These wells were last sampled in 2004. As requested, ASI will evaluate whether any of these wells vertically connect different water-bearing zones.

Technical Comment 7: Lead Scavengers

Response - During the next semiannual groundwater monitoring event, samples collected from existing wells will also be analyzed for the lead scavengers, ethylene dibromide (EDB) and 1,2-dichloroethane (DCA), by EPA Method 8260B, in addition to petroleum hydrocarbon-related analytical tests.

Technical Comment 8: Vapor Well

Response - ASI will research information about the construction of a vapor monitoring well associated with a fuel release in 1985 at the site. We will review information provided by the property owner, and ASI may also visit the City of Livermore building department to research records, permits, and "as-built" drawings. Details about the well construction, if discovered, will be shown on the new cross sections.

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Technical Comment 10: Site Conceptual Model

Response – Following the completion of the above work, we will discuss with ACEH whether the preparation of a detailed Site Conceptual Model (SCM) is warranted. If so, a SCM would be developed and submitted in a separate document.

Technical Comment 11: Corrective Action Plan

Response – ACEH has requested that a Corrective Action Plan (CAP) be submitted for the “final cleanup of contamination in soil and groundwater” within 60 days after ACEH approval of the *Soil and Groundwater Investigation Report*. We do not know if corrective action will be necessary, so further evaluation and discussion about this comment can be undertaken after completion of the above work.

Technical Comment 12: Geotracker EDF Submittals

Response – In accordance with State law, ACEH has requested that all analytical data collected on or after September 1, 2001, be uploaded to the State Water Resources Control Board’s (SWRCB) *Geotracker* website by October 3, 2005. In a November 3, 2005, ACEH letter, the submittal date was extended to December 9, 2005. Because laboratory analytical reports could not be uploaded by December 9, in a November 10, 2005, email ACEH gave another submittal extension to January 18, 2006.

COMPILATION AND ANALYSIS OF DATA AND REPORT PREPARATION

After the analytical results are received, and the other work outlined above has been completed, the data will be compiled and a detailed report will be prepared and submitted that will include the following:

- A summary of the site background and history
- A site map showing the boring locations
- Descriptions of the drilling and soil sampling methods
- Lithologic logs of the borings
- Geologic cross sections
- Updated information on the well survey
- Tabulated soil and groundwater results
- Analytical reports and chain-of-custody documentation
- A discussion of petroleum hydrocarbon distribution at the site
- Soil and water disposal methods, and
- Conclusions and recommendations.

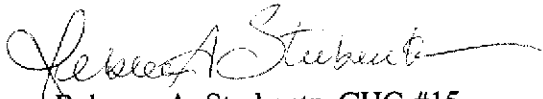
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SCHEDULE

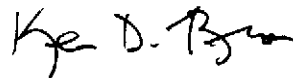
ASI will begin work on the investigation after receiving ACEH's authorization to proceed. We will submit the application for drilling permit and conduct the underground utility check. We anticipate that the ACEH will issue the drilling permit within three weeks of receiving our application. The work associated with the research tasks described above can be completed while we wait for the drilling permit application to be approved. As soon as the permit is available ASI will schedule the drilling and sampling field activities. The laboratory will make the analytical data available approximately three weeks of receiving the samples. The written report for the investigation will be completed approximately four to six weeks of receiving the analytical data.

If you have any questions regarding the proposed work plan, please call the undersigned at (925) 283-9098.

Respectfully yours,
Aquifer Sciences, Inc.



Rebecca A. Sterbentz, CHG #15
President



Kevin D. Brown, CEG #2180
Senior Project Hydrogeologist

cc: Rita Sullins, Arrow Rentals, Inc.

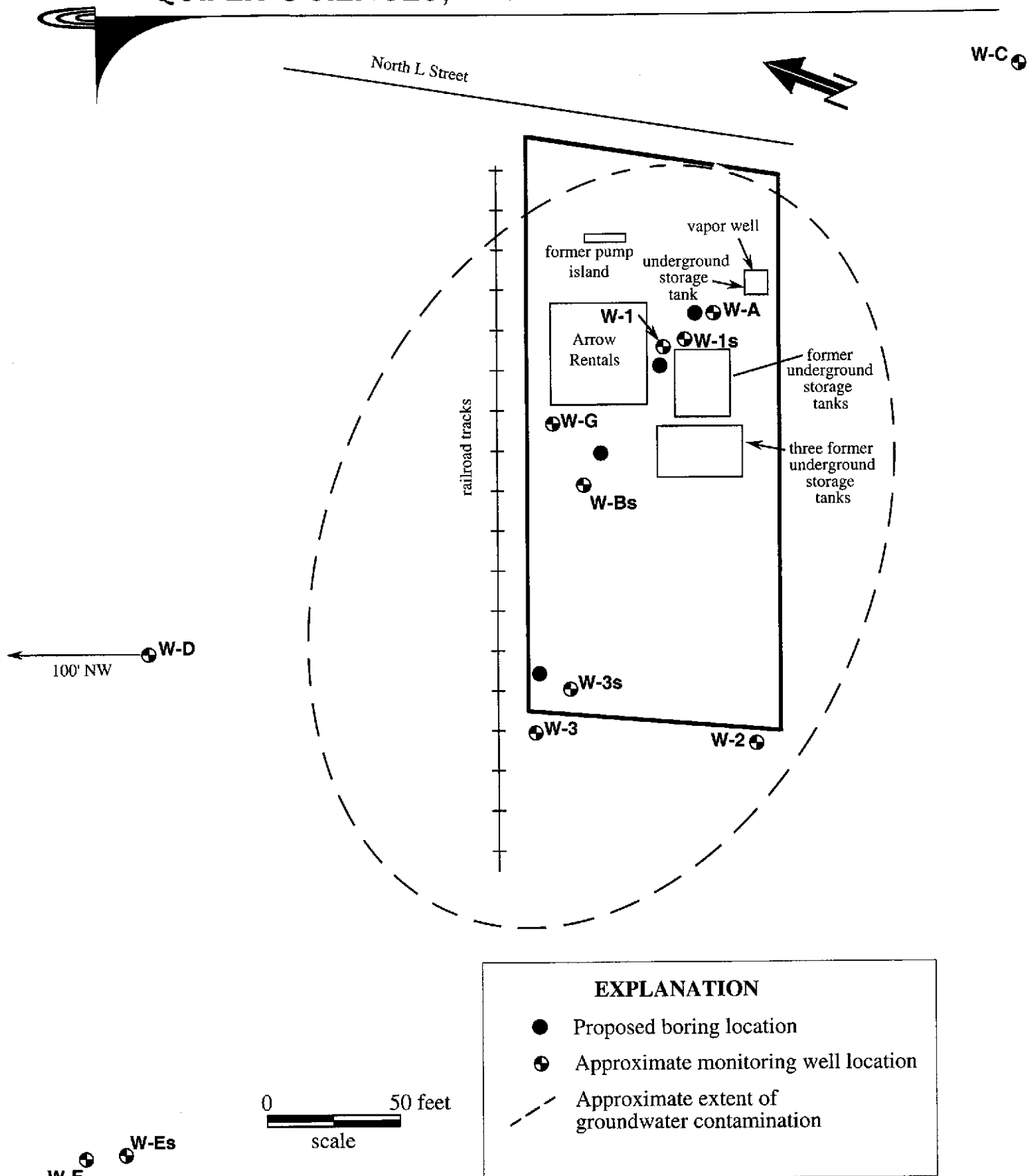


Figure 2. SITE Map
187 North L Street, Livermore, California